



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/471,460	12/22/1999	Thomas A Figura	94-0280.03	7429

7590 03/20/2002

CHARLES BRANTLEY
MICRON TECHNOLOGY INC
8000 S FEDERAL WAY
MAIL STOP 525
BOISE, ID 83716

EXAMINER

LEE, CALVIN

ART UNIT PAPER NUMBER

2825

DATE MAILED: 03/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/471,460

Applicant(s)

FIGURA et al.

Examiner

Calvin Lee

Art Unit

2825



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on January 10, 2002 (Amendment D)

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) 45 and 46 is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 45 and 46 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirements.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. _____.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

19) ☐ Notice of Informal Patent Application (PTO-152)

17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 17

20) ☐ Other: _____

OFFICE ACTION

Response to Amendment

1. The cancellation of claim 44 in Paper 19, dated January 10, 2002, is acknowledged.

Claim Rejections - 35 USC § 112

2. Claims 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The invention does not disclose or suggest "metal lines", but a conformal layer of polycrystalline silicon which is formed on the wafer (Fig. 1, pages 1 and 5)

Claim Rejections - 35 U.S.C. § 102

3. Claims 45-46 are rejected under 35 U.S.C. 102(b) as being anticipated by *Chouan et al* (US 5,079,178).

Chouan discloses a method of forming a polymer between features **106**, **108** inside a plasma chamber (using CH₄, H₂, and Ar as plasma etchant gases), comprising the steps of:

- performing a deposition of a polymer film **110** on a wafer **100** in a site (Fig. 1c and col. 3)
- etching in the same site simultaneously with performing the deposition

4. Claims 45-46 are rejected under 35 U.S.C. 102(e) as being anticipated by *Nulty* (EP 721,205) or *Imai et al* (US 6,089,183).

- a) *Nulty* discloses a method of forming a polymer between features on a wafer inside a plasma chamber (col. 9, lines 10-41), comprising the steps of:

- etching an insulator **501** to form a recess **521, 522** (using CHF_3 and C_2F_6 as etchant gases simultaneously with performing a deposition of a polymer resist layer **1107** inside the recess (Figs 7, 10A, 10B, 11 and cols. 11-13)

- etching the resist layer out from the wafer (col. 15, lines 3-15)

b) *Imai* teaches or suggests a method of forming a polymer within a recess inside a single high density plasma chamber (Figs. 1, 10, and 16), comprising the steps of:

- etching an insulator **1** to form a recess **7** (using CHF_3 , CF_4 , ClF_3 , and CH_2F_2 as etchant gases) simultaneously with performing a deposition of a polymer resist layer inside the recess (Figs. 2b, 3a and col. 12, line 26 through col. 13, line 25)

- etching the resist layer out from the wafer surface using parameters known in the art (Figs. 3a-3b and col. 12, line 9)

Imai discloses a plurality of ways that have been developed to create a trench so as to make a contact via in a semiconductor circuit. One such way is taught in column 3, lines 19-43, wherein the wafer is placed in a plasma source chamber and exposed to a plasma. A mixture gas ("feed gas") is used including CF_4 , CHF_3 , etc. In creating the contact hole (or via) in the plasma dry etching procedure, the reference at the above location teaches that inherently a polymeric film is created by plasma polymerization resulting in the deposition of a polymer film on the etched portion including the sidewalls. Upon completion of the holes, metal is inserted so as to create the electrical contact for transmission of an electrical signal. The absence of the polymer can be

done by either subsequential removing the polymer or by using different gases (as suggested by *Imai* in another embodiment).

Therefore, a polymeric layer is provided between the metal lines using the feed gas and each and every claimed element is found in *Imai* (meets claim 45).

Response to Arguments

5. The first argument forwarded by Applicants in the Remarks is that in arguing a previous case Examiner indicated that the applicant's arguments were persuasive on the combination of *Imai* and *Fujita*. While the reading of a common issue in one application may carry weight in a similar application, Examiner in reviewing the prior art of the present case finds that Applicants' comments are unpersuasive on this issue. Upon working the other case, we will likewise take this position. However, in reviewing the art, Examiner finds that *Imai*'s reference reads directly on the claims pending thus rendering the argument moot. However, Examiner should and does have the right to review the prior art and if an earlier reading is found to be incorrect amend his/her reading of the prior art by issuing a rejection if needed.

The second argument refers to Examiner has misinterpreted *Imai*'s reference. In reviewing the prior art, contrary to applicant's reading, *Imai* does not teach doing away with the polymer layer in a contact hole. *Imai* teaches that plasma etching devices are well known in the art and have a variety of advantages over other forms of etching. The object of *Imai* is not to remove the polymer layer but to control its growth and restrict the creation of polymer dust when creating the hole. *Imai* teaches that when using the plasma etching technique that inherently a

polymer is created which lines the hole and the sidewalls of the hole. *Imai*'s objective is control the growth of the layer and to prevent the dust created by the etching to eventually form on the chamber walls. If such dust were developed then there would be constant maintenance issues as the walls would require cleaning. *Imai* uses the fluoride gases to restrict the generation of dust and thus prevent the need to clean the chamber. In light of this reading, Applicant's "teaching away from forming polymers" lacks merit. And furthermore, upon a closer reading of the references Applicants' claimed invention is anticipated by the teachings of *Imai*.

In other words, Applicants' arguments that Examiner's rejection is based upon a misinterpretation are unpersuasive. Whether or not *Imai* specifies that the polymer forms a dust that interferes with device fabrication, *Imai* clearly indicates that the presence of the carbon-based gases (which exposes a wafer previously placed in the chamber) forms the polymer inside the recess. This polymer formation due to the presence of the gases at least is identical to what disclosed in the application, page 5.

In conclusion, Applicants' arguments are moot in light of the new rejection.

Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at 703-306-5854, Monday to Thursday, from 7 to 5 (Eastern Time). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* whose telephone number is 703-308-1323.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

CL

March 18, 2002

C. J. Juchart
GROUP 1 EXAMINER
PATENT EXAMINER